

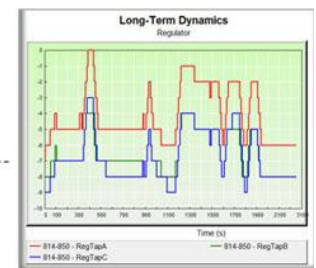
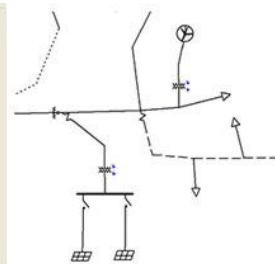
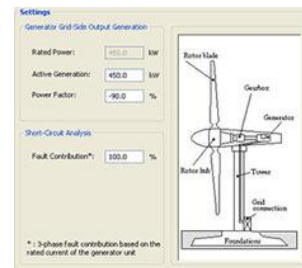
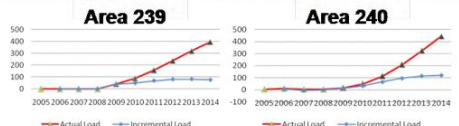
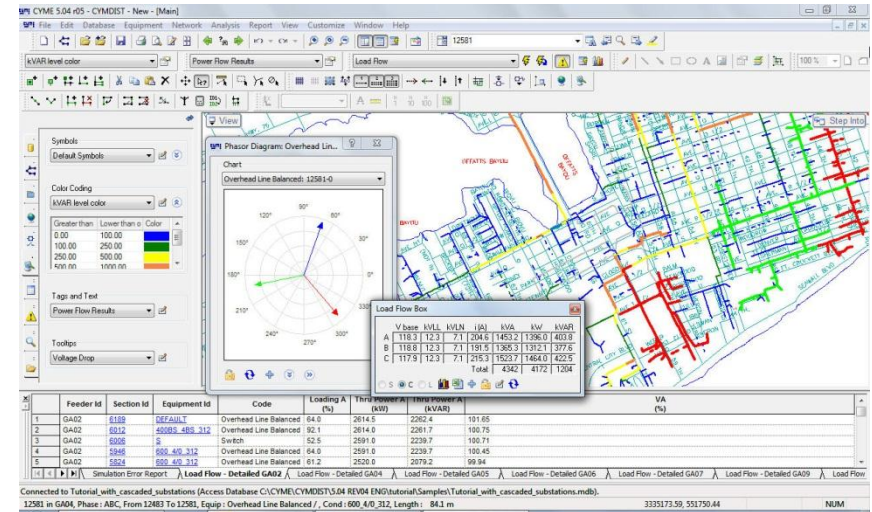
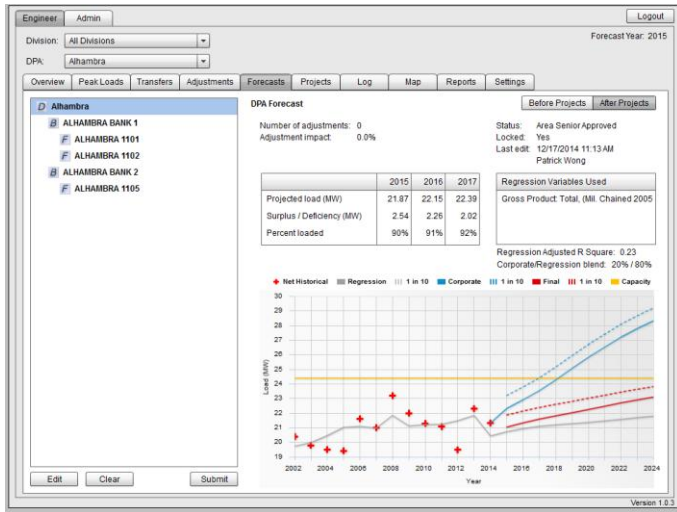
# Distribution Planning Tools and Methodologies

January 8, 2015

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*Donovan Currey*  
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# Distribution Planning Tools



Load Forecasting

Power Flow Modeling & Analysis

# Load Forecasting Tool

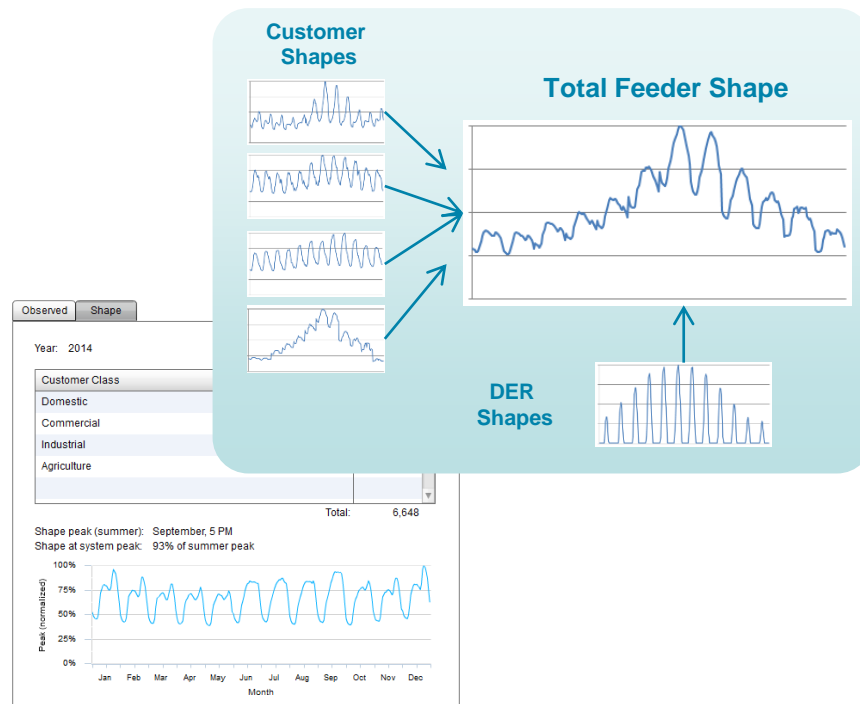
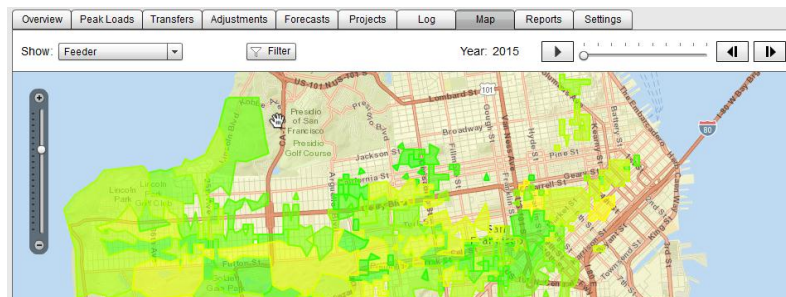
## LoadSEER (Integral Analytics)

- **Integrated Geospatial and Regression Load Forecasting Tool**

- Utilizes historical loading, economic indicators and historical temperature data to perform a standard multi-variable regression forecast based on a 1 in 2 and 1 in 10 temperature event.
- Utilizes demographic economic data, GIS data, historical customer class KWH consumption at the transformer and feeder level to simulate and forecast new customer class growth geo-spatial to an individual acre area.
- Utilizes weather normalized historical customer class hourly load data to create circuit and bank hourly load profiles to translate the system peak forecast to a non-simultaneous peak load forecast. These shapes provide the capability to analyze future impacts to the forecast for new customer class loads or DER.
- Provides circuit level growth outputs which are used within the CYME program to model the circuit level impacts of the future load growth.

- **DER Incorporation**

- DER shapes can be incorporated into the load shapes just as new loads are incorporated and accounted for towards forecasts.



# Power Flow Modeling and Analysis Tools

## CYMDIST (CYME International T&D)

### • CYMDIST Tool

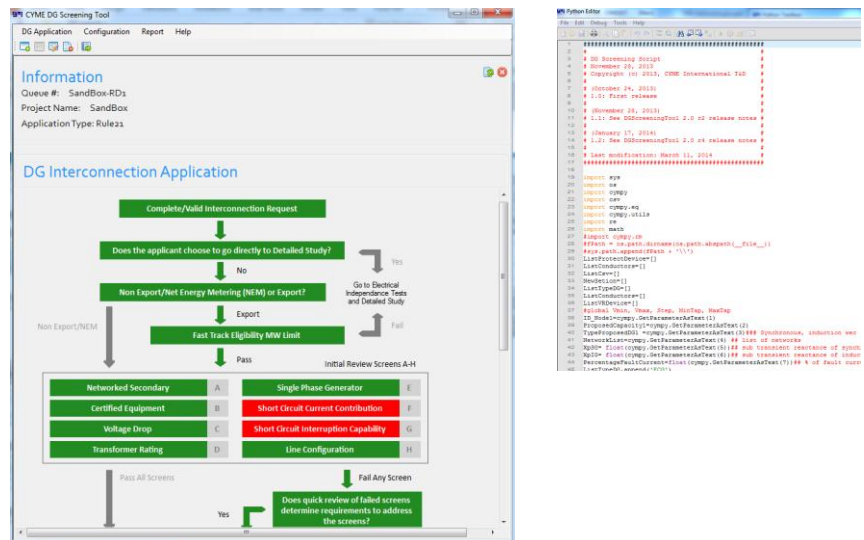
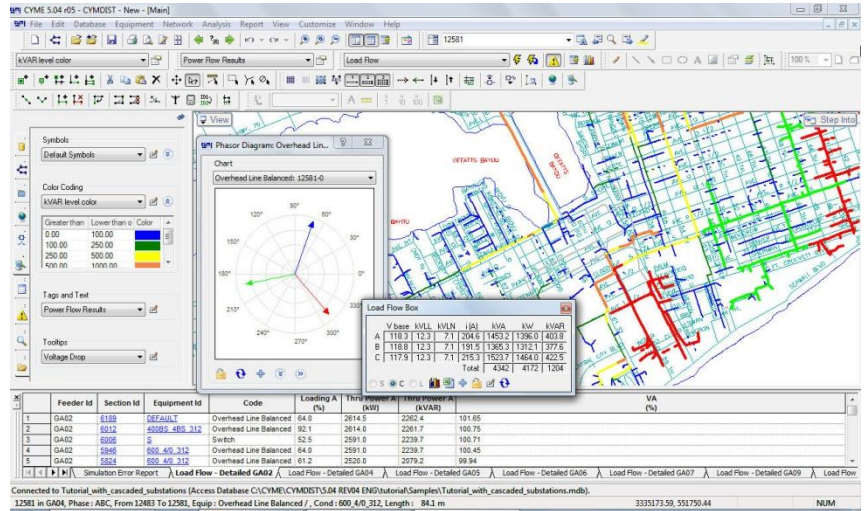
- Power flows analysis of all feeders
- Fault and protection review
- Load Profile analysis (hourly load flow)
- Volt –Var Optimization (VVO)
- Distributed Generation Modeling

### • Circuit information database updated weekly to capture system changes

### • Stand alone CYME Distributed Generation (DG) Screening Tool

- Assist with Fast Track and Pre-Application by analyzing CYMDIST model of distribution circuits
- Currently designed to analyze single interconnection point

### • Programming capabilities within CYME could be utilized to perform automated and batch analyses on the whole system



PG&E models all its distribution feeders and analyzes them on an annual basis for peak conditions or as requested in the generation interconnection process or system operations review.

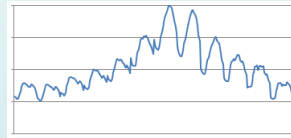
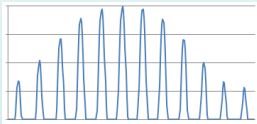


# Melding of Distribution Planning Tools

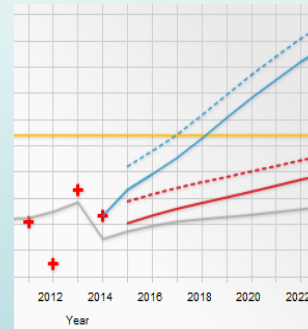
LoadSEER's output can be leveraged to enhance the use of the utility's existing suite of planning tools, including direct exports to CYME, SynerGEE or other power flow tools.



**CYMDIST can utilize load/DER shapes to run time dynamic power flows and determine more precise impacts and how DER aligns with peak/minimum loads**



**CYMDIST can utilize forecasts and scenarios exported from LoadSEER to determine more accurate impact to distribution circuits.**



# Methodologies

## Efforts to determine Integration Capacity

- Provide Integration Capacity value ranges at feeder level
- Utilize CYMDIST distribution feeder model to gain insight to protection and voltage effects
- Utilize LoadSEER feeder shapes to determine DER coincidence to feeder load for thermal and islanding limitations

